REMARKS

Claims 1-12, 14-23, and 25-40 remain in this application. Claims 13 and 24 have been cancelled. Claims 1, 12, 15, 20, 27, 31, 35, and 38 have been amended.

Applicant thanks the Examiner for the detailed study of the application and prior art.

The present claimed invention encodes information into a video signal in a novel and unobvious system and method that inserts new data content into an active portion of the video signal by substituting a modulated frame of data into top and bottom video lines containing luminance information. This is an improvement over prior art data insertion techniques that insert data into vertical and horizontal blanking intervals of a video signal, or as in the cited prior art, encode an ancillary code into an active video portion by spreading a code over several frequencies as in U.S. Patent No. 5,737,025 to Dougherty et al. (hereinafter "Dougherty"). A decoding method and decoder and associated decoder system are also set forth and claimed.

Applicant stresses that the invention, such as now claimed in claim 1 of this Amendment, stresses that a modulation and video synchronization circuit converts content data into at least one modulated frame of data having video synchronization information. An interleaver is operatively connected to the modulation and video synchronization circuit and interleaves the modulated frame of data into selected lines of the video data stream by substituting the modulated frame of data into top and bottom video lines containing luminance information. FIG. 4 is an example and shows content data in the top and bottom video lines. This function can be

accomplished by the encoder and associated circuits shown in FIG. 1. These circuits include a data conversion, buffering and synchronization circuit that receives stored video data, and an interleaver processing and control circuit that is operative with the interleaver and receives enhanced content data or live enhanced content data and interleaves this content by substituting the modulated frame of data into top and bottom video lines containing the luminance information. The top and bottom video lines containing luminance information are often shadowed on the video display. Even if the display at top and bottom lines is not shadowed, because only top and bottom video lines have been substituted by the modulated frame of data, the overall picture clarity is not compromised excessively with the present invention. Amended claim 12 for the encoder is directed to the modulation and video synchronization circuit and video signal decoder circuit.

Applicant notes the rejection of claims 20-22, 24-27, 38 and 40 as anticipated by U.S. Patent No. 5,737,025 to Dougherty; claims 15-16, 18 and 19 as anticipated by U.S. Patent No. 5,666,170 to Stewart; and claims 1-14, 23, 28-37 and 39 as obvious over Dougherty in view of U.S. Patent No. 5,581,361 to You et al. (hereinafter "You").

Applicant stresses that nowhere do the prior art references either singularly or in combination disclose or suggest the system, encoder, decoder and method where the modulated frame of data from a modulation and video synchronization circuit, for example, is substituted into selective video lines of the video data stream by substituting

the modulated frame of data into top and bottom video lines containing luminance information.

Although Dougherty may suggest in its abstract that an ancillary code is added to a composite video signal in its active video portion, as set forth in line 1 of the abstract and cited by the Examiner, Dougherty is a complicated circuit and method that spreads the ancillary code similar to a spread spectrum transmission system over several frequencies that are summed at the output of a decoder to enhance legibility of the ancillary code at the output of the decoder. It is not a substitution as in the present claimed invention of a modulated frame of data having video synchronization information into selected lines of the video data stream using an interleaver by substituting the modulated frame of data into top and bottom video lines containing luminance information.

Dougherty uses a time-stamp coupled to a first ancillary signal encoder and a number of code segments and code slots. A data encoder receives the ancillary signal code and adds it to a composite video signal and applies the encoded ancillary signal code to a carrier modulator, controlled by a microprocessor over a control line. Dougherty modulates the carrier with the encoded ancillary signal code and applies the modulated carrier to an inserter, which inserts the modulated carrier into the composite video signal. A complicated encoding system occurs over several frequencies as non-integral multiples of a harmonic for a horizontal sync frequency are used as the ancillary signal code. This is nowhere suggested in the present claimed invention where the interleaver interleaves the modulated frame of data, including

the video synchronization information, into selected lines of the video data stream by substituting the modulated frame of data into top and bottom video lines containing luminance information, such as by the circuit shown in FIGS. 1 and 4.

In Dougherty, a multi-level encoded signal monitoring system operates in several modes using the ancillary signal code. It operates in several modes of operation as set forth in column 8, starting at line 1 and continuing through column 9, line 37 as follows:

> The multi-level encoded signal monitoring system 10 may be operated in several modes. For example, in one embodiment of the present invention, hereinafter referred to as the single frequency mode embodiment, the microprocessor 38 controls the data encoder 42 so that an ancillary signal code is encoded by the data encoder 42, is modulated onto the carrier by the carrier modulator 44, and is inserted by the inserter 46 into a narrow, non-interfering frequency band within the bandwidth of the composite video signal.
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> In accordance with the teachings of Hathaway, Loughlin, Gerdes, and others, this ancillary signal code may be in the form of a narrow-band add-on signal having a frequency which is a non-integral multiple of a harmonic of the horizontal sync frequency. Such a signal is generally non-interfering, because most of the power of the composite video signal is clustered at harmonics of the horizontal sync frequency. When operated in the single frequency mode, the ancillary signal encoder 12 only needs a clock 40 if a time-stamp is desired as a part of the added ID code.
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> * * *
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> In a second mode of operation, hereinafter referred to as the fixed frequencies mode, a set of narrow-band signal addition channels, each centered about a corresponding non-interfering frequency within the bandwidth of the composite video signal, would be selected for use by all of the ancillary signal encoders 12-1, 12-2, . . . 12-N. As is known, one may select a set of non-interfering frequencies, f_i, expressed as
>
> $$f_i = f_H (2m+1)/2,$$

where f_H is the horizontal sync frequency, and m is an integer varying between from about 110 to about 209 and from about 246 to about 266.

* * *

Thus, in a fixed frequencies mode, several of the one hundred or so non-interfering frequencies may be selected, and the television signal may be encoded at each of these selected frequencies. The decoder 16 or 18 in a fixed frequencies system would acquire signals at all of the selected frequencies and sum all of these acquired signals.

* * *

In a third mode of operation, hereinafter referred to as the "stepped frequencies" mode, a sequence of carrier frequencies, f_j is selected by the ancillary signal encoder 12 (e.g., from a table 54 of such frequencies stored in the ROM 52), and sequential portions of the ancillary signal code (or sequential repetitions of the ancillary signal code) are added at each of the frequencies f_j with a predetermined time interval Δt (which also may be stored in the ROM 52). The sequence of selected frequencies may or may not follow a simple sequential path from highest to lowest, or lowest to highest.

* * *

In the stepped frequency mode, the decoder 60 necessarily includes the tunable bandpass filter 62 in order to select the frequencies f_j. The tunable bandpass filter 62 steps through the frequencies f_j under control of the microprocessor 70 in synchronism with the ancillary signal code that it is reading. These frequencies may be selected, for example, in accordance with a table of frequencies 80 and a predetermined time interval 82 in the ROM 76.

* * *

It is evident that a number of large frequencies, including several of the one hundred (100) non-interfering frequencies are selected and the television signal encoded at these selected frequencies. In the present claimed invention, the top and bottom video lines are selected, and the modulated frame of data is substituted into the top and bottom video

lines containing luminance information. The present claimed invention is much different and is nowhere suggested by Dougherty.

As to the cited You reference, Applicant notes that in You a compressed image data is determined in accordance with the speed and various burst and random errors, which are processed and corrected in recording/reproduction systems using compressed data. This signal uses an interleaver and deinterleaver for a digital VCR. A controller determines the specific interleaver/deinterleaver region in accordance with a predetermined maximum speed used in recording and reproduction of compressed image data. A memory stores and reads out compressed image data in a specific format. The interleaving and deinterleaving is performed with data provided from the memory. Although an interleaver and deinterleaver are disclosed, nowhere does You disclose or suggest a deinterleaver or interleaver that is operative for first interleaving a modulated frame of data into selected lines of a video data stream by substituting a modulated frame of data into top and bottom video lines containing luminance information, and at a decoder stage, deinterleaving the modulated frame of data by extracting the content data from top and bottom video lines in the video signal.

(2)

The cited Stewart reference is directed to decoding video signals that are encoded in different formats using an adaptive coder to provide a decoded output as a function of a code rate selected from a number of code rates. Stewart is directed to digital television systems that can accommodate multiple decoding functions using digital television signal processing methods. The deinterleaver or interleaver in

Stewart is operative with a synchronization network that detects sync words in interleaved data signals and provides output signals synchronized in beginning of data. The sync words are not interleaved, but occur at periodic intervals in time. Output synchronization signals from a unit 75 are provided to address generators 80 and 85 for synchronizing address signals from generators 80 and 85 with interleaved data for a mapper 70. According to Stewart, the generators 80,85 are operative as portions of deinterleavers that synchronize address signals with interleaved data from a mapper 70. A sequence of write addresses are produced by the generators 80,85 to ensure that interleaved data from the mapper 70 is written into memory locations of memory 95 in the order in which the input interleaved data is received. This sequence of read addresses produced by generators 80,85 ensures that data is read out of memory 95 in a desired interleaved order. This information can then be decided by a decoder.

Nowhere does Stewart disclose or suggest the present claimed invention of any decoder or system that decodes a video signal in which luminance information has been substituted with a modulated frame of content data on top and bottom video lines of an active portion of the video signal and a line separation and restoration circuit extracts the content data from top and bottom lines of the active portion of the video signal.

It is clear that the present claimed invention as now set forth in the amended claims in this Amendment is patentable over the cited prior art. Nowhere do the references either singularly or in combination suggest the

system, method, encoders, and decoders of the present invention.

Applicant contends that the present case is in condition for allowance and respectfully requests that the Examiner issue a Notice of Allowance and Issue Fee Due. If the Examiner has any questions or suggestions for placing this case in condition for allowance, the undersigned attorney would appreciate a telephone call.

Respectfully submitted,

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Julie Lalan